Thomas A. Edison - Caveat

Experiments for reproducing and multiplying phonograph records. Orange, Oct.21,1887.

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Papers in re experiments for reproducing and multiplying phonographic records.

Caveat for

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Received from
Thos. A. Edison
Nov. 3/87.

DYER & SEELY,
No. 40 WALL STREET,
NEW YORK.

Caveat - Thos A Edison
Orange, N.J. - Nov. 3 - 1887 -
Papers - in - experiments - for
reproducing and
multiplying phono-
graphic records

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The object of this invention is to reproduce or multiply Copies of phonographic Records Called phonograms

The following is a record of Experiments tried, being tried and untried,

After the cylinder or plate is covered with wax or simular material is indented by the action of the vance, The Cylinder is placed in a vacuum Chamber Containing two Electrodes of Gold or other unoxidizable metal and an arc being formed by bringing the points together & seperating the same the Electric Current Causes the metal of the points to be vaporized & this is deposited in a perfect manner over the whole of the Exposed surface of the cylinder The latter if necessary is rotated while being deposited on by Clockwork in the Vacuum — Thus the non conducting surface is perfectly Coated with a Conducting surface more perfect than

By any other means, it is then taken out of the Vacuum Chamber placed in a Mould & backed up by either Type metal or plaster of Paris or it may be placed in a plating Bath & the Repast may be increased to a ~~Quarter~~ 1/4 of an inch ~~&~~ with Copper nickel &c in the usual manner — Whens a prepared the mould is Cut ~~in~~ 3 parts by an Exceedingly thin Saw it is jointed with hinges so that when closed it will come accurately together, the space left by the saw being replaced by a strip of metal, - the loss of 2 or 3 undulations ~~does not~~ is not noticeable to the Ear — after this is done. The cylinders may be reproduced by Type metal plaster paris Sealing wax under a slight pressure; while soft Gums resins, Oxychloride Zinc, Chloride Oxide Magnesia, & Thick paraffined tin foil placed in the cylinder ~~against the~~

inner face & then poured with a semi solid like putty Viscous tar or piece of Rubber, Gutta percha etc & the whole subjected to pressure which forces the foil into the undulations over the whole surface thus reproducing the record — on removing the semi solid plaster Paris may be poured into back up the foil — The cylinder opened the record taken out and the process gone over again to produce the second cylinder —

If the cylinder reproduced has a plaster of Paris face, The cutting quality of the surface which tends to produce scratching & wearing away of the point may be modified & reduced by dipping in a thin solution of a gum or wax in a volatile solvent, like perfume in Benzol etc, or Gelatine — fish glue Tragacanth, in water, gutta percha — in Chloroform or flexible collodion

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It is impossible to take a cylinder of very hard wax and by raising its temperature to a certain point it is recorded upon / when it cools it hardens very materially & this cylinder may be used to reproduce on the surface of a similar cylinder coated with a hard wax softened by heat, the indenting cylinder being kept cool — If the two cylinders are placed on rotating shafts & the two surfaces be brought accurately together with considerable pressure, the single rotation will perfectly transfer the record of one to the other,. This second cylinder may itself be used to reproduce the record audably but it is preferably used to indent a great number of cylinders thus reproducing the records almost indefinitely

The recorded cylinder may have its surface coated with plumbago so as to cause it to become an electrical conductor and this placed in a

plating bath & covered as quickly as required by Copper or other plateable metal, ~~The~~ But in this case it is essential to add one feature to ensure perfect results which feature is new & that is the graphite always used by electrolypers must be ground very much finer than now used otherwise the particles of graphite are themselves in many cases as larger & at larger than many of the undulations due to operating Especially in the hissing Sounds & overtones of Stringed instruments. But the graphite may be ground so fine that the depret will not arise & perfect surface is obtained But it is never so perfect & accurate as that due to Electro vacuous deposits.

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On hard wax cylinders recorded upon while softened by a rise of temperature, Tin foil very thin & polished is then placed over the entire surface — over this again is poured plaster paris, & after setting. The Wax is melted or dissolved out by its proper Solvent The Mould is then split in 2 or more sections.

& Molten Waxes gums & Bitumens. Soap - & Setting Compounds Etc Can be run in

The cylinder or plate having a wax surface is made of several pieces of thin paper. & straw paper for instance winding on a mandrel to the proper Size the End being fastened by glue & Tragacanth, Gum or Adhesive substances not effected by the hot wax or any solvent thereof: To insure a clean smooth inner surface to Each phonogram so it

will regulate accurately - pass on the holder in the phonograph properly I take a sheet of smooth material for instance hard calendered card board - of such a size that will just wrap around the mandrel & the two Ends butt together, over this the body of the phonogram is wound of the coarse fibrous paper. Thus when the paper phonogram is pulled off the mandril it has a smooth inner surface, - This inner sheet may have the surface which goes over the mandril coated with a smooth surface of Varnish Asphalt for instance or shellac after the Ends of the cylinder so formed is Cut off by a Cutter (the mandril having 2 grooves - 1 at each end of the cylinder the whole is pulled off and another

Cylinder may be formed.
Another method of forming
Cylinders is to have a mould
in which plaster paris, Lime
water glass, Oxide of Zinc & Chloride
Zinc, Oxide Magnesia & Chloride
Magnesia, or other setting material
may be poured thus forming the hollow
cylindrical shell ready for putting in the
thin wax surface for recording
This mould may be greatly strengthened
and powders such as Earthy Oxides
mixed with tar, or asphalt may be
forced into the mould when softened
by heat & cylinders produced by
this method. Where the Cylinders
are to be very light Light porous
bodies like Lampblack Charcoal
Cork may be mixed with powdered
asphalt, Pitch or other materials
which will soften by a gentle

heat, & thus the whole be forced into
the mould the Asphalts etc
hardening immediately as the
Temperature drops binds the whole
together, The cylinders may
Either be formed of a hard wax or
asphalt itself - & afterwards
surfaced with the after material
for ~~coloured~~ recording.

Another method of forming
plates or shells is the use of the
Lead pipe press whereby compounds
softened by heat such as asphalts.
mixed with various inert substances
like brick dust Chalk, Lime etc
may be squirted out with great
rapidity & be remarkably smooth
& accurate, Paper or wood or straw pulp mixed with
gums, Bitumens in a saluable a viscous
condition, Glue, may be softened by
heat making a plastic mass that

Temperature not reaching high enough to char the ~~paper~~ pulp; can be squirted through the lead pipe plaster as any required from the surface afterwards being waxed to receive the record,

Boric acid may be squirted into cylinders or plates when the proper heat is applied the whole being waxed to prevent the action of the atmosphere.

Even glass itself may be squirted in this manner. a special glass having an excess of alkali & lead oxide rendering it extremely fusible.

It is essential to transmit phonogram cylinders by mail, if these are made of friable substances they are very liable to be crushed, indented, or otherwise injured in transit.

Cylinders of a slightly increased size may be used made of lime & asphalt moulded hot. will

Stand a great pressure — & thus preserve the enclosed phonogram from injury.

Metallic phonogram shells say of Zinc, Typemetal or brass tubing, may be used in many cases,

~~Cylinders~~ Shells may be turned out of Wood. ~~Hard rubber shells~~

Sawdust mixed with binding substances can be moulded or pressed.

T A Edison

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